

# **ESTIMATED STATEWIDE RESIDENTIAL RECYCLING RATES**

**DELAWARE SOLID WASTE AUTHORITY**

## ***TASK A***

***Estimated Residential Recycling Rates:  
Voluntary Subscription Curbside Recycling,  
DSWA Drop-off Recycling Program, and Yard Waste Landfill Ban***

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## **FINAL REPORT**

*Prepared By:*

**DSM ENVIRONMENTAL SERVICES, INC.**

23 Thrasher Road, PO Box 466

Ascutney, VT 05030

Tel/Fax: (802) 674-2840 / (802) 674-6915

[www.dsmenvironmental.com](http://www.dsmenvironmental.com)

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## **Introduction**

As a follow-up to the *Analysis of Mandatory Curbside Recycling Program Costs* (Task B, Final Report, October 28, 2004), DSM Environmental Services (DSM) was also contracted to estimate a statewide residential recycling rate resulting from:

- (1) Voluntary subscription curbside recycling collection service operated by the Delaware Solid Waste Authority (DSWA);
- (2) Continuation of the Recycle Delaware drop-off program; and
- (3) A statewide landfill yard waste ban.

This report provides DSM's best estimate of the most likely range of household participation rates associated with a statewide, DSWA operated, voluntary subscription collection service. The estimate is based on current participation rates in New Castle County as reported by DSWA, the price that DSWA is currently charging for the service, and the expectation that DSWA will mount an expanded promotional effort at a statewide level to convince households to sign up for the service.

Residential recycling rates are then calculated based on reported per household set-out rates for recyclables, and assuming continuation of the Recycle Delaware drop-off recycling program, and expected yard waste diversion associated with a landfill ban.

The analysis and subsequent rate calculations are based on three key assumptions.

First, an analysis has been conducted on data provided by DSWA on participation rates and setout quantities from the voluntary curbside recycling program currently offered by DSWA in New Castle County.

Second, data from mature voluntary subscription programs in Columbus, Ohio and Indianapolis, Indiana have been used to estimate likely participation rates over time in Delaware associated with a stepped up, statewide promotion program for the subscription service offered at \$6/month.

Third, because DSM believes that household income plays an important role in both participation in subscription programs and the setout rate, two different participation rates have been used to estimate the expected range in diversion of recyclables associated with an expanded statewide subscription service.

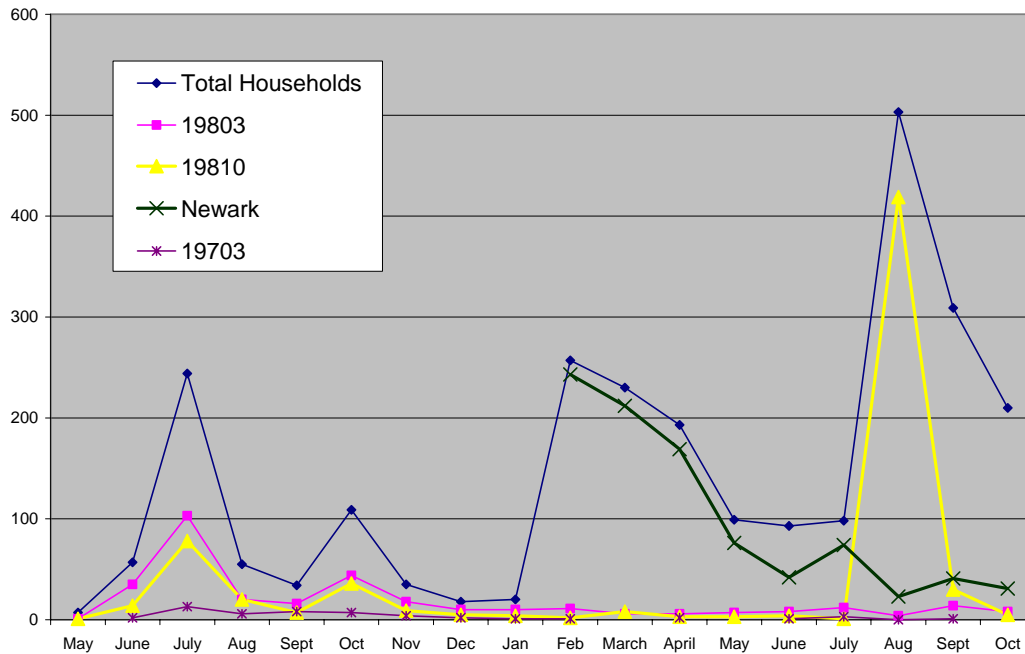
Expected diversion from a statewide residential curbside collection subscription service was then added to statewide Recycle Delaware drop-off quantities, existing municipal recycling collection programs, and the estimated diversion of yard waste associated with a landfill ban on yard waste disposal to calculate statewide residential recycling rates.

## **Section I: Analysis of the Current Voluntary Curbside Recycling Service Subscription Rates**

Curbside recycling service has been offered on a subscription basis to all residents of New Castle County as of September 1, 2004. Prior to that, service was offered only to households in specific zip codes within New Castle County.

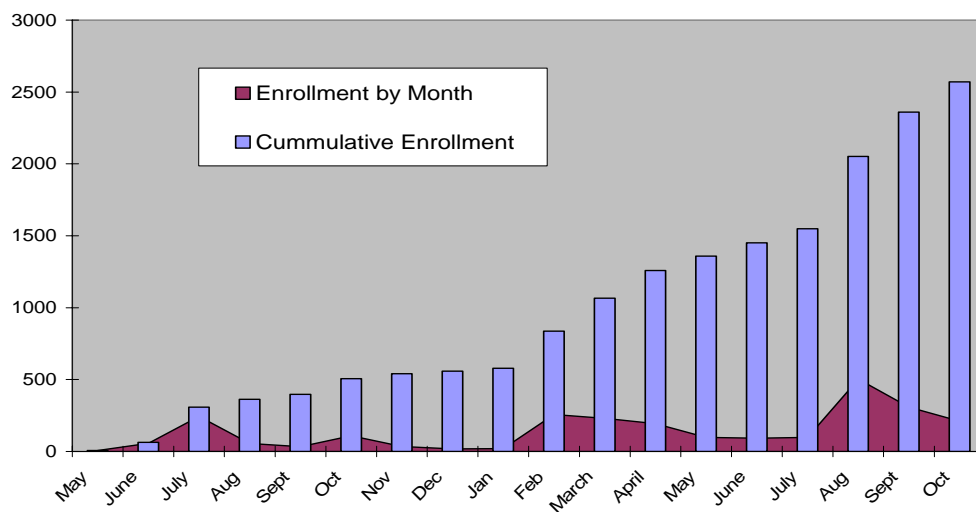
The first four zip codes were offered service in May 2003. All households were sent a mailer and advertising was placed in the community newspapers. In February 2004, Newark was also offered the service. Figure 1 shows enrollment by month for all of New Castle County and Newark and the four zip codes offered the program back in May 2003.

**FIGURE 1**  
**Curbside Recycling Enlistment By Zip Code by Month**



With the exception of Newark's enlistment in February 2004, there are two peaks of enlistment – in July of 2003 and in August of 2004. Both these peaks correspond with advertising campaigns that expanded beyond mailers and local newspapers. For example in July and August of 2004, billboards, buses and radio advertisements promoted the availability of the curbside service to *all* New Castle County households.<sup>1</sup> After the introduction of these promotional campaigns enlistment dropped back down. Figure 2 shows cumulative enrollment tracked by month.

**FIGURE 2**  
**Subscription Curbside Enrollment by Month**  
**(Households Subscribing May 2003 - October 2004)**



<sup>1</sup> Telephone conversation with Rich Von Stetton, DSWA, October 28, 2004.

### ***Current Participation Rates***

As of October 26, 2004 a total of 2571 New Castle County (NCC) households had subscribed to the curbside recycling service. They represent **1.3 percent** of all NCC households.

DSM analyzed enrollment by zip code to determine if demographic factors such as median household income affected subscription rates. This analysis was used to help estimate how enrollment might change over time in New Castle County and what the participation rate for the whole state might be when the service is offered statewide.

Table 1 provides more detailed information on participation by zip code. However some of the zip codes included in Table 1 have only been offered the service since this summer (2004).

**TABLE 1**  
**Enrollment and Household Income by Town/Zip Code**  
**(Source US Census 2000)**

<b>Zip Code</b>	<b>Number of Subscribers</b>	<b>Total Households</b>	<b>Participation Rate (%)</b>	<b>Average Household Income</b>	<b>Date of First Enlistment</b>
Ardentown (19810)	649	10,275	<b>6.3%</b>	\$67,623	May 8, 2003
Wilmington (19803)	333	8,700	<b>3.8%</b>	\$75,608	May 14, 2003
Newark (19711)	649	19,375	<b>3.3%</b>	\$62,258	Feb. 6, 2004
Centerville/Greenville (19807)	58	3,398	<b>1.7%</b>	\$105,971	May 24, 2004
Hockessin (19707)	64	5,407	<b>1.2%</b>	\$97,403	June 2, 2004
Middletown (19709)	69	6,808	<b>1.0%</b>	\$67,650	April 28, 2004
Wilmington (19809)	116	14,586	<b>0.8%</b>	\$49,570	May 7, 2003
Claymont (19703)	52	7,070	<b>0.7%</b>	\$42,009	June 17, 2003
Newark (19702)	96	17,117	<b>0.6%</b>	\$54,089	April 15, 2004
Wilmington (19806)	31	5,944	<b>0.5%</b>	\$44,907	July 10, 2003
Wilmington (19805)	76	16,758	<b>0.5%</b>	\$36,493	March 3, 2004
Wilmington (19808)	92	39,665	<b>0.2%</b>	\$57,242	March 31, 2004
New Castle (19720)	36	21,488	<b>0.2%</b>	\$46,669	March 26, 2004
Wilmington (19802)	32	27,751	<b>0.1%</b>	\$36,057	Jan. 27, 2004
Wilmington (19804)	14	17,954	<b>0.1%</b>	\$46,012	June 28, 2004

### ***Estimating Statewide Participation***

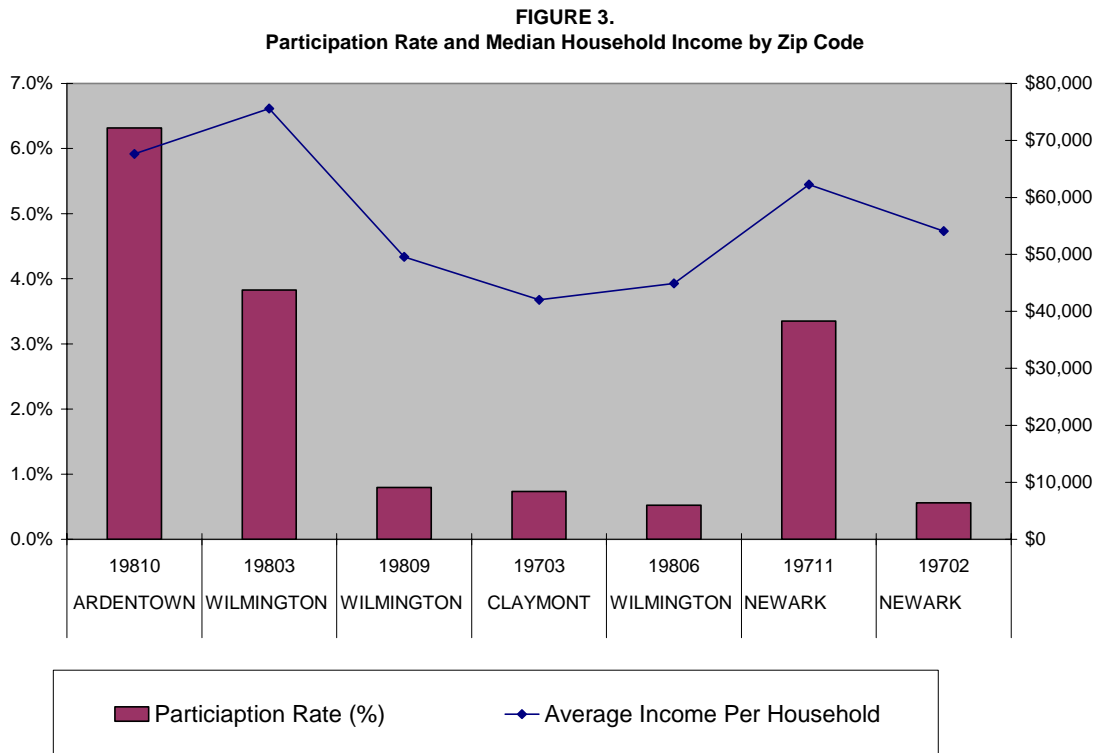
There are several challenges associated with predicting statewide participation rates based on the data available from New Castle County.

First, the service has only been offered to *all* New Castle County households since September (2004) with some households subscribing to the service during the summer months when the advertising and promotions for the countywide service began.

Second, income levels vary within zip codes and DSM's analysis of enrollment by zip code is based on the median household income for the zip code (US Census 2000 data) and not the medium household income for those that have subscribed to the service.

Third, enrollment tends to peak with promotional campaigns and drop when advertising wanes. In addition, the marginal gains in enrollment from promotional campaigns are likely to be smaller over time as households most likely to participate at \$6 per month have already subscribed to the service.

Therefore the best data available is probably that from the zip codes that have been offered the program for the longest period of time. Figure 3 charts participation rates and median household income for those zip codes that have been offered the program since February 2004 (Newark) or before.



Together these seven zip codes have a total of 1,938 subscribing households from a population of 68,549 households (according to the 2000 census). This represents a participation rate of 2.8 percent. However, the median household income is \$56,581 as opposed to the statewide median household income of \$47,381.

As shown in Figure 3 the highest participation level is found in Ardentown (zip code 19810) followed by Wilmington (19803), then Newark (19711). These three zip codes also have higher median household income than the other four zip codes that have been offered the service since May 2003. As illustrated by Figure 3, participation rates track income levels well with the exception of Wilmington 19803. However it is likely that the average income in Wilmington (19803) masks higher participation in the wealthier neighborhoods within this zip code.

As evidenced by the experience thus far in New Castle County, subscription rates are influenced by household income, and will rise or fall depending on promotional activities. Clearly, the price at which the service is offered also has a significant impact on participation.

Current participation rates in New Castle County, for a \$6 per month subscription fee, are 1.3 percent of total households. This is expected to increase with a sustained promotional campaign. However, without a mandatory requirement that everyone subscribe to the service and pay for the service whether they use it or not, it is highly unlikely that participation rates will ever reach levels similar to those in non-subscription curbside programs.

Limited data are available on curbside recycling subscription rates in other cities and states nationwide<sup>2</sup>. This is primarily because subscription service is generally controlled by the private sector and such data are not public. In other cases, the subscription service is offered at a much lower (subsidized) price per household, which increases participation, especially if there is also a PAYT refuse disposal price.

DSM is aware of two cases that are similar to what is being proposed in Delaware. Columbus, Ohio offers drop-off recycling similar to the Recycle Delaware program, and has negotiated a price per household for subscription service, that a single franchised hauler (Rumpke) offers citywide. The negotiated rate is \$5 per month for weekly service. According to Rumpke, **six percent** or less of Columbus households subscribe. However, the median household income in Columbus, at \$37,897 is lower than the median statewide household income in Delaware.

Rumpke also offered subscription service for a similar price in parts of Indianapolis, Indiana. The participation rate there was estimated to range from **12 to 15 percent**.<sup>3</sup> Although data are not available, Rumpke believes that the income level in the neighborhoods where the service was offered was higher than the median income level for the City as a whole.

Therefore in the absence of data over a longer time period from DSWA's program, DSM has assumed that the participation rate statewide will be at least what Columbus and Ardentown have experienced at about six percent. This may grow to as much as 12 percent over time if DSWA sustains a statewide promotional program for the service. DSM believes that subscription rates over 12 percent of households will cause equivalent losses in tonnage collected from residents at the drop-off, negating the impact of the increase in subscription rates. Therefore, DSM has estimated diversion based on 6 and 12 percent household curbside recycling participation statewide.

### ***Estimating Per Household Curbside Recycling Diversion***

DSM obtained recent weekly quantities of recyclables collected from the current DSWA curbside recycling program. During four consecutive weeks starting on September 27 (2004), the fifteen curbside routes collected a total of 152,680 pounds of material or 76 tons (rounded). Multiplying by 13 four-week periods in a year by 76 tons yields 990 tons per year (rounded).

During this time period, households continued to sign up for the program. Using the last week of recycling weight data only, which totaled 41,120 pounds or 20.6 tons, to estimate annual quantities yields 1070 tons rounded (20.6 tons by 52 weeks).

To calculate curbside recycling quantities set out by participating households, DSM estimated average annual quantities of recyclables set out per household based on the same four weeks of data (starting September 27, 2004). During this time households continued to enroll in the program. Therefore DSM divided weekly quantities by the number of households that had subscribed to the program as of the first day of the week. On average, households that had subscribed to the program set out 15.9 pounds of material. Multiplying 15.9 by 52 weeks yields an annual average of 826 pounds recycled curbside per household. Multiplying 826 pounds per household times the number of households enrolled in the last week of the period (2571 households), times 52 weeks yields 1060 tons per year. This is essentially equivalent to the 1070 tons per year calculated from the last week of data. Therefore, recycling rates associated with the subscription service are estimated based on an average of **826 pounds** per participating household per year, and an annual quantity collected from participating households in New Castle County of **1070 tons**.

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<sup>2</sup> DSM searched for information on subscription rates where households subscribed to recycling separate from refuse

<sup>3</sup> Telephone conversation with Tom Burke and Mark Rumpke of Rumpke, October 5, 2004.

## **Section II: Estimated Residential Recycling Rate**

Table 2 presents the estimated statewide *residential* recycling rate associated with various levels of materials and yard waste recycling. Because of the large number of ways that recycling rates can be manipulated depending on assumptions, and inclusion or exclusion of different materials, this section specifies the procedure and assumptions used throughout the calculations. In all cases an attempt has been made to be consistent with the following reports that have also been prepared by DSM:

- *Evaluation of Enhanced Residential Waste and Recyclables Collection and Processing for New Castle County*, October 2003;
- *Analysis of the Impact of a Yard Waste Ban On Landfill Quantities and Household Costs*, September 2004; and,
- *Task B: Analysis of Mandatory Curbside Recycling Program Costs*, October 2004.

### ***Adjustments to Current Recycle Delaware Drop-Off Tonnage***

DSM requested the most recent statewide tonnage data for Recycle Delaware drop-off locations. Data were provided by DSWA for the period September 2003 through August 2004, by county. DSM adjusted the totals down by fifteen percent to account for business and out-of-state resident usage of the drop-off, based on DSM survey data from New Castle County conducted in 2003.

### ***Current DSWA Subscription Recycling Collection Service Tonnage***

As discussed above, it is assumed that approximately **1070 tons** (rounded) of material will be collected over the next year from New Castle County households participating in the DSWA subscription service

### ***Current Municipal Curbside Recycling Programs***

Tonnages reported to DSM in 2003 for the Wilmington and Delaware City curbside programs were included here.

### ***Estimated Residential Yard Waste Diverted***

Data on Landscaper, Tree Service, Municipal and DSWA yard waste diversion programs were taken directly from Table 8.1 of the *Analysis of the Impact of a Yard Waste Ban on Landfill Quantities and Household Costs*, September 2004. These quantities represent DSM's best estimate of the quantities of residential yard waste that are currently being diverted to off-site management locations throughout Delaware.

DSM then adjusted the estimated impact of a yard waste ban to reflect residential waste only. This drops the per capita yard waste generation rate from the 234 pounds per year to 205 pounds per year based on the SCS Engineers waste composition analysis.<sup>4</sup> The estimate for yard waste diverted off-site was then adjusted, consistent with DSM's yard waste report by subtracting 76 pounds per capita assumed to be landfilled under the ban, and then assuming 30 percent of the remaining 129 pounds per capita would be disposed of on-site, leaving 90 pounds per capita diverted to non-landfill off-site facilities. This represents *New Tons Diverted Due To Ban* in Table 2, below.

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<sup>4</sup> See Footnote E.1 of the *Analysis of the Impact of a Yard Waste Ban On Landfill Quantities and Household Costs*, DSM, September 15, 2004.



### ***Total Material Diverted Estimate***

Tons diverted through the Recycle Delaware drop-offs, the DSWA subscription recycling collection service, current municipal recycling collection programs, and the various yard waste diversion activities are summed to calculate current diversion from landfilling of residential recyclables and yard waste.

### ***Residential Mixed Solid Waste Generation***

Total residential generation of mixed solid wastes was taken directly from the September, 2002 Franklin Associates report to DSWA titled: *Assessment of Delaware Solid Waste Discards in 2000 and the Potential For Recycling of Materials, Table 9, Products Recovered From the Municipal Waste Stream*.

The following adjustments were made to the Franklin data, based on DSM's 2003 report to RPAC, *Evaluation of Enhanced Residential Waste and Recyclables Collection and Processing for New Castle County*:

- Residential recyclables were broken out separately from all other wastes.
- Yard waste discards were adjusted down to reflect the use of SCS Engineers waste composition data – this reduced the total Other Waste category by 110,000 tons.
- Yard waste diverted from disposal were **added** to the total based on Table 8.1 of DSM's 2004 report, *Analysis of the Impact of a Yard Waste Ban On Landfill Quantities and Household Costs*.
- All 2000 quantities, except 2004 Yard Waste Diverted from Disposal, were adjusted up by 6.7 percent to reflect population growth in Delaware from 2000 to 2005, the year of the analysis. The 2004 estimate of Yard Waste Diverted from Disposal was not adjusted up because the data are less than one year old.

### ***Estimated Recycling Rate***

The recycling rate for each system analyzed was calculated by dividing the total residential recyclables and yard waste diverted by the total residential mixed solid waste, which includes the diverted waste. Note that *Total Diversion* and *Residential MSW* estimates have been rounded to the nearest 1000 to reflect the level of uncertainty associated with these estimates.

**TABLE 2.**  
**Estimated Recycling Rates For Various Recycling and Yard Waste Diversion Programs**

Residential Recycling Rate Calculation	Current 2004	Statewide Voluntary Subscription Service Percent of Total Households Participating			Mandatory Curbside
		1.3%	6%	12%	
	(tons)	(tons)	(tons)	(tons)	(tons)
Recycle Delaware Drop-Off Tonnage	16,600	16,600	16,600	16,600	2500 (1)
DSWA Subscription Curbside Program	1,070	1,700	8,000	16,000	0
Current Municipal Recycling Programs					
Wilmington	52	52	52	52	
Delaware City	37	37	37	37	
Mandatory Curbside Collection (2)					53,644
Residential Yard Waste Diverted					
Municipalities and Landscapers	20,724	20,724	20,724	20,724	20,724
DSWA Drop-Off	4,500	4,500	4,500	4,500	4,500
Tree Services	25,000	25,000	25,000	25,000	25,000
New Tons Diverted Due To Ban (3)		37,877	37,877	37,877	37,877
<b>Total Diverted:</b>	<b>68,000</b>	<b>106,000</b>	<b>113,000</b>	<b>121,000</b>	<b>142,000</b>
Residential MSW:	477,000	477,000	477,000	477,000	477,000
<b>Rate:</b>	<b>14%</b>	<b>22%</b>	<b>24%</b>	<b>25%</b>	<b>30%</b>

(1) Assumes small number of drop-offs remain open for glass and non-curbside materials only.

(2) Tons collected from *low cost system* assumptions from Task B report.

(3) Tons collected from residential yard waste only.

### Section III: Conclusions

- The recycling rate for the current system is estimated to be 14 percent. This is based on the statewide drop-off recycling program but with subscription collection service only offered in New Castle County.
- Assuming the same level of household participation statewide that is currently occurring in New Castle County (1.3%), expansion of the subscription recycling collection service to the entire state *and* enactment of a ban on yard waste disposal at the landfill for *residential yard waste only* would result in an estimated recycling rate of 22 percent. The increase is driven primarily by the impact of the yard waste ban.
- Assuming an increase in participating households in the subscription curbside recycling collection service to six percent of all households statewide increases the recycling rate, including the yard waste ban, to 24 percent. As discussed above, this level of participation is consistent with the level of participation in a mature subscription service offered throughout the City of Columbus, Ohio, and that seen in Ardentown (zip code 19810).
- DSM believes that with an aggressive advertising and promotion program, DSWA could potentially increase household participation to 12 percent of all households' statewide, assuming no increase in the \$6/month fee for the service. This would increase the recycling rate, which includes the yard waste ban impact, to 25 percent.
- Finally, the estimated recycling rates associated with a voluntary subscription service and a yard waste ban are compared with mandatory curbside collection statewide coupled with continuation of a limited number of drop-offs to collect glass (which is assumed to be excluded from curbside collection), and implementation of a yard waste ban. It is estimated that the lowest cost mandatory system described in DSM's Task B report would result in a recycling rate of 30 percent.

# Appendix 1